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ABSTRACT

This paper analyzes the amount of time required by farmers in four villages on the western edge of the central plain of Thailand to adopt four agricultural innovations--fertilizer, herbicide, insecticide, and fungicide. The general objective is to help researchers interested in the relationship of the adoption of new ideas to economic development understand the process of passing from awareness to adoption. A more specific objective is to check on the cross cultural validity of work done by researchers in the United States on the adoption period. General findings of past research regarding the temporal context of decision making indicate that (1) awareness occurs at a more rapid rate than adoption; (2) the time required for early adopters to complete the initial stages of the innovation adoption process is shorter than for later adopters; (3) the later stages require more time for earlier adopters than later adopters because innovators are creating the precedent for later adopters; (4) the inability of potential adopters to acquire innovation frequently delays the time of adoption; (5) and the first individuals to adopt innovations require a shorter overall adoption period than do relatively later adopters. Findings from analysis of data on the Thai farmers did not support these findings. The conclusion is that access to sources who possess the knowledge necessary to evaluate new technology may more accurately explain the rate at which innovations are adopted than intrapersonal differences of early and later adopters. The implication is that researchers should re-evaluate their thinking about the proposition that lack of knowledge does not delay adoption. (Author/DB)

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THE TEMPORAL CONTEXT OF ADOPTION

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THE TEMPORAL CONTEXT OF ADOPTION

Evidence that adoption of innovations is not a simple, easy process is the time that it requires. Change takes time, much time. Despite generally favorable attitudes toward change in nations like the United States, a considerable time lag exists from the introduction of a new idea to its widespread adoption. One goal of adoption research is to better understand this change process. Although this is obviously important in nations like the United States, it is even more important in developing countries where new technology is crucial to economic development.

The present study represents an attempt to perform some preliminary checks on the cross cultural validity of work done by researchers in the United States on the adoption period; the time required to pass from awareness to adoption. The main dimension of analysis in the present discussion is individual differences in adoption period rather than differences in adoption periods among various innovations. The respondents were Thai farmers residing in four villages on the western edge of the Central Plain of Thailand (Fig. 1). The adoption of four agricultural inputs by the farmers was examined. They included: fertilizer, herbicide, insecticide, and fungicide.

The Adoption Period

A general finding of past research is that adoption of an innovation follows a bell snaped curve when plotted over time. This type of distribution is essentially "s"-shaped when plotted on a cumulative basis. Tarde in 1903 described this process as showing a slow advance in the beginning, followed by a rapid and uniformally accelerated process, followed again by a process that continues to slacken until it finally stops.

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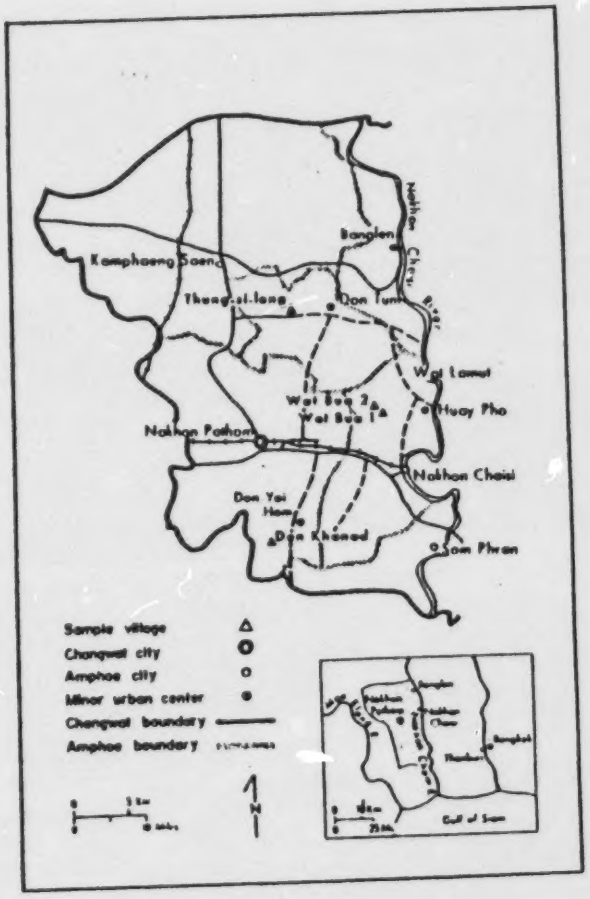

Fig. 1. The Study Area: Nakhon Pathom Province.

A major portion of the time lag between the introduction and adoption of an innovation has been assumed to be the time elapsing from awareness to adoption, which is measured in days, months, and years. Wilkening, in the 1950's described this gestation period in the following way: "The adoption of an innovation is a process composed of learning, deciding, and acting over a period of time. The adoption of a specific practice is not the result of a single decision to act but a series of actions and thought decisions." While everyone would agree that this is a mental process, it is not totally unobservable as suggested by some. Researchers have outlined a number of steps or stages during this process when information is necessary for one to complete the decision-making and acquisition phases of adoption.

Two aspects of the adoption period have attracted considerable attention. They include research: a) focusing on the potential adopters' access to the necessary information to evaluate an input, and b) concerned with the actual time required to pass through the various phases of the decision-making process by individual adopters. Of the two, the greatest emphasis has been on the former. The general findings of this research has been that while there is some lag in information access, there is nevertheless, "little evidence that lack of knowledge actually delays adoption." This proposition first presented by researchers in the 1950's has continued to gain support until recently because of the assumed role of the opinion leader during the information and influence phases of adoption and findings which suggest that most commercial and manufactured goods flow down the urban hierarchy.

Among those researchers focusing specifically on the temporal context of decision-making the findings suggest:

1) Awareness occurs at a more rapid rate than adoption.

2) The time required for early adopters to complete the initial stages of the innovation adoption process is shorter than for later adopters. (Fig. 2)

3) The later stages require more time for earlier adopters than later adopters because innovators are creating the precedent for later adopters. (Fig. 2)

4) The inability of potential adopters to acquire innovation frequently delays the time of adoption.

5) The first individuals to adopt innovations require a shorter overall adoption period than do relatively later adopters. (Table 1)

The Data

When the temporal context of adoption of the four inputs by the Thai farmers was analyzed, the data, with one exception, did not support previous findings. Awareness occurred at a slower rate than adoption (Fig. 3). On the average, 15 years elapsed before the farmers in each village were aware of the inputs, but adoption averaged 5 years. The farmers ability to physically and economically acquire the inputs was not a major factor delaying their adoption as suggested by many researchers (Fig. 3).

Similar and equally pronounced differences from prevailing theory were also evident when the gestation periods of early and late adopters were compared. Early adopters passed through the initial stages of the decision-making process at a slower pace than did later adopters. They also required more time to complete the later stages of innovation adoption (Fig. 3). When the adoption periods of the farmers were grouped into four adopter categories based on the time of adoption the overall gestation period also differed significantly from previous findings. The farmers who were the first to adopt, the innovators, required more time to complete the process than

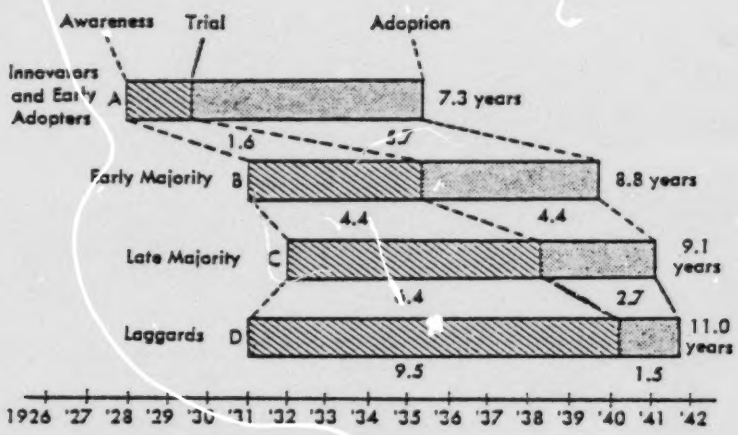

Fig. 2. The Innovation Decision-Making Process

Source: A reanalysis of data from Gross (1942, pp. 58-59).

TABLE 1

LENGTH OF THE ADOPTION PERIOD BY ADOPTER CATEGORY

Adopter Category	*LENGTH OF ADOPTION PERIOD (IN YEARS)*			
	2,4-D Spray in Iowa	*Antibiotics in Iowa*	*2,4-D Spray in Ohio*	*"Miracle" Fabrics in Iowa*
Innovators	0.40	1.50[b]	0.20	0
Early adopters	0.55	0.53		0.61
Early majority	1.14	0.79	1.20	1.70
Late majority	2.34	1.52	2.14	1.49
Laggards	4.65	4.12	5.09[a]	2.71

Source: Unpublished data from Ohio and Iowa studies (Rogers, 1955 & 1957).

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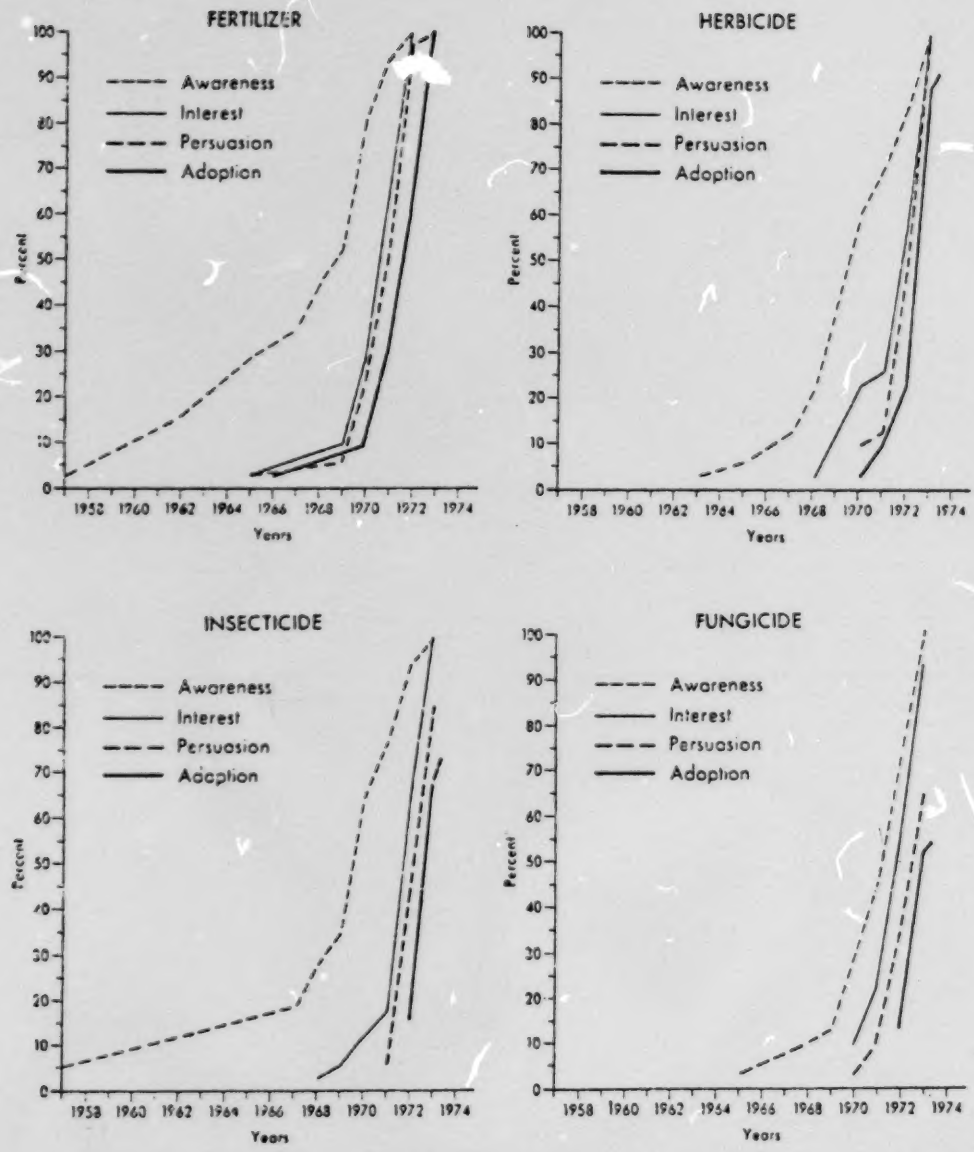

Fig. 3. The Time pattern of the Innovation Decision-Making Process: Example from Wat Bua 2.

the later adopters, and the last to adopt, generally termed laggards, required the least amount of time (Table 2).

Based on the assumption that lack of knowledge was not a factor delaying adoption, intrapersonal characteristics of each category of adopters have been offered as evidence for the lag in the adoption period and the justification for the terminology innovator to laggard. In this study, the data did not validate previous findings about individual differences in adoption period because the Thai farmers did not have equal access to the necessary information to evaluate the inputs. The only exception to this occurred at the acquisition phase when farmers readily advised each other where to purchase the input.

Formal mass media of localite and cosmopolite origin were found to be of limited value in linking farmers in the four villages with information available outside. In each village, no more than 4 percent of the farmers gained information about any of the inputs from mass media and none cited them at other than the awareness stage.

The channels which did link the villages with information from outside were interpersonal in nature. Farmers, however, did not have equal access to knowledge from these sources. Each of the four inputs were propagator supported and the distribution policies of these agencies did not include all places and people in the Thai central place hierarchy. Spatially and temporally this was limited to those places and people where they perceived the greatest likelihood of success. Selected higher order centers in the province (changwat) met this criterion, but nearer lower order centers did not (Fig. 4). It was a number of years later before the small urban centers near the four villages gained this information, and it was not based on a downward flow of information from the propagators (Fig. 5). Instead local farmers serving as secondary propagators channeled

Table 2

Number of years required for farmers to complete the innovation decision-making process.

Village	Quadrant	Fertilizer	Herbicide	Insecticide	Fungicide
Wat Bua 2	1st	5.70	6.00	9.10	4.50
	2nd	3.64	2.45	3.10*	.67*
	3rd	1.50	1.10	1.75	.11*
	4th	.40	Same Year	.25*	Same Year
Wat Bua 1	1st	7.50	7.50	7.00	4.00
	2nd	4.50	4.50	4.50	2.25
	3rd	.25	.75	1.50	.25
	4th	.50	Same Year	Same Year	Same Year
Don Khanad	1st	5.88	4.88	2.00*	4.25
	2nd	2.87	1.50	1.60*	1.13
	3rd	1.56	1.06	.60*	Same Year
	4th	.625	Same Year	Same Year	— *
Thung-si-long	1st	6.18*	2.44	2.30*	.80
	2nd	2.72	1.87	.54*	1.50*
	3rd	.62	1.23	.77	.20*
	4th	Same Year*	.10	Same Year	Same Year*

* Not all farmers in that quadrant have completed the decision-making process.

Source: Survey Data 1975.

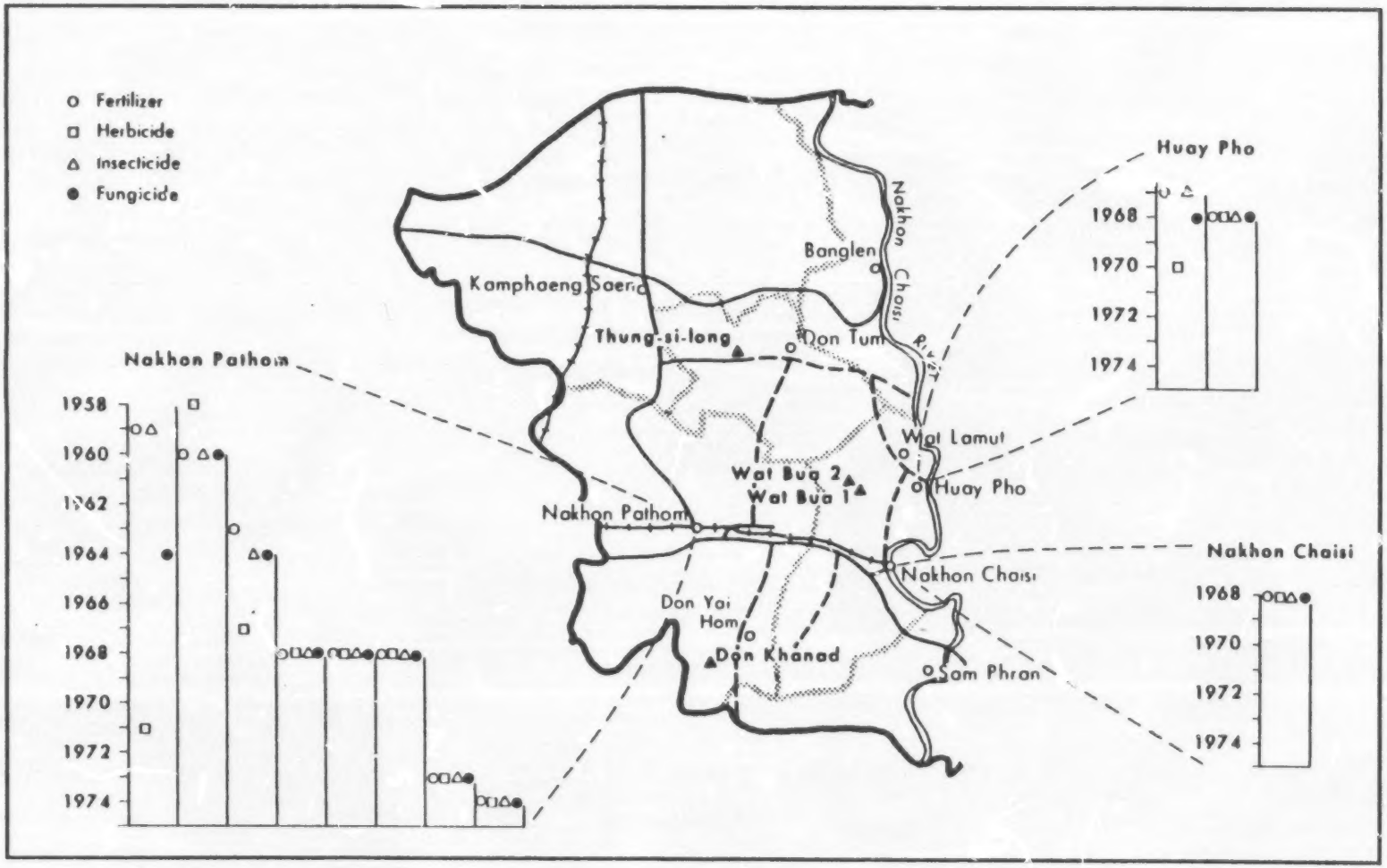

Fig. 4 . Information and Input Availability Via Private Propagators;

1. Dates Private Entreprenuers First Stocked each of the Four Inputs for Rice.

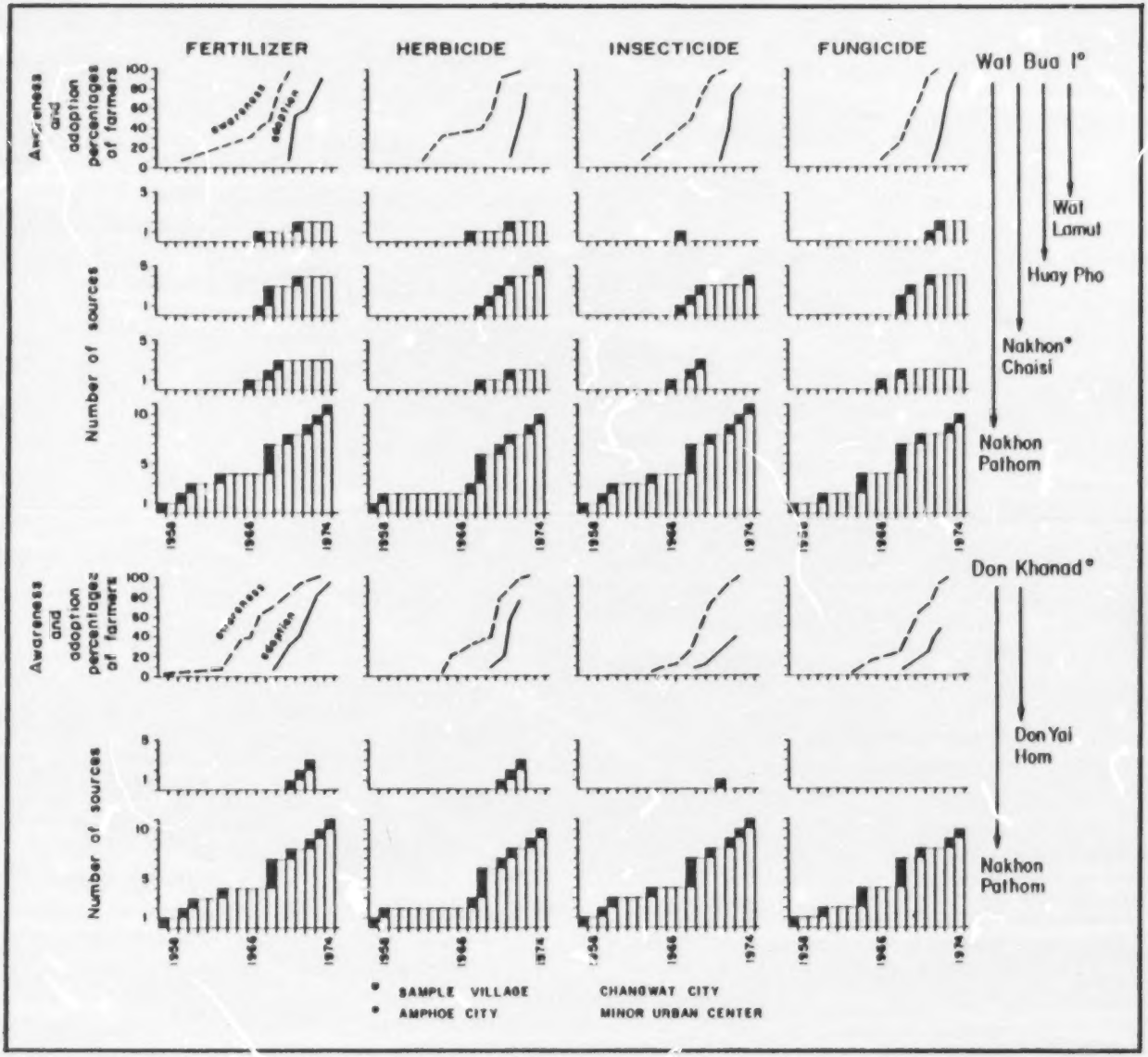

Fig. 5. Time Order of Adoption of Agricultural Inputs in Each Urban Center in the Study Area and the Farmers' Awareness and Adoption Time.

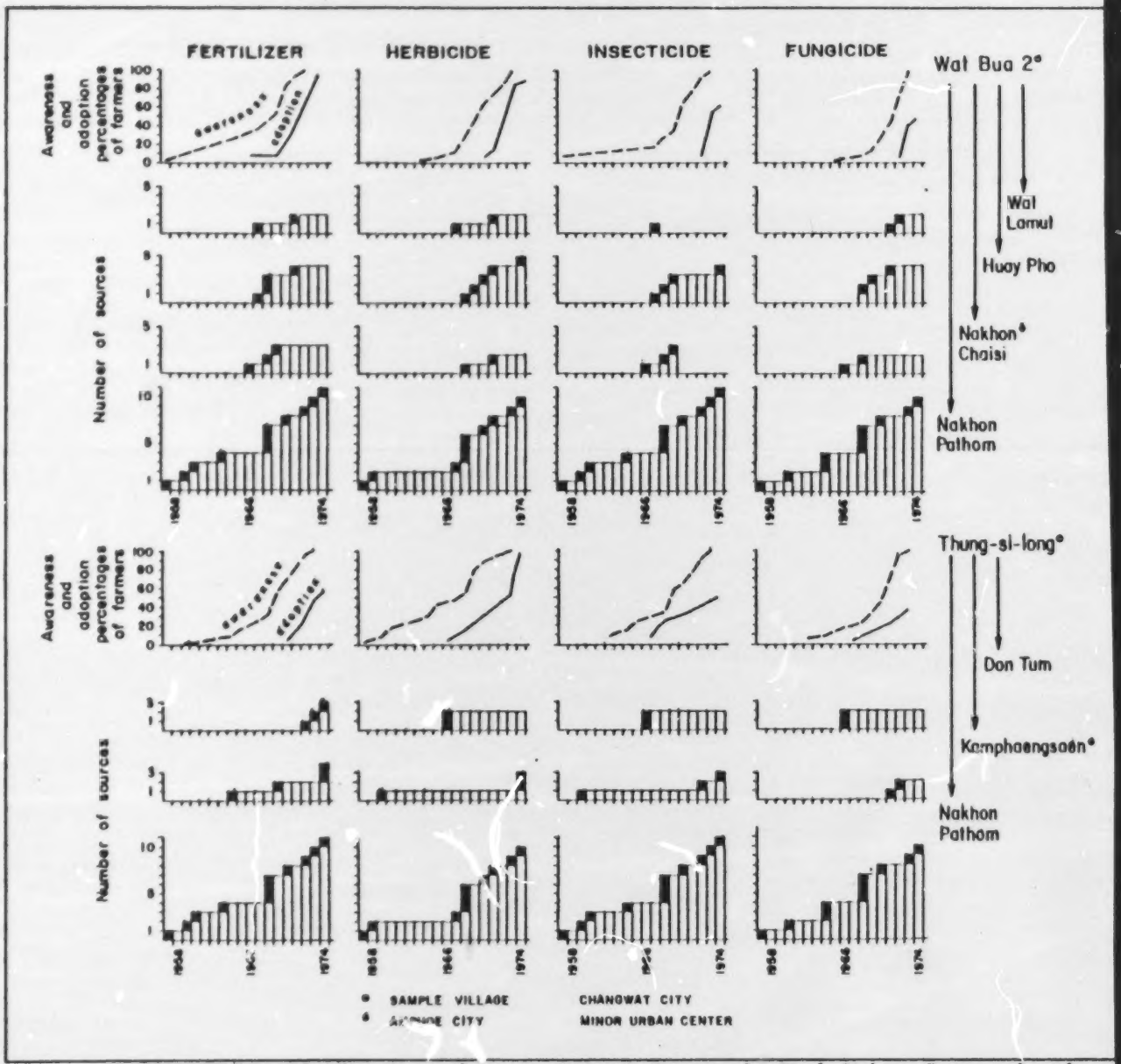

Fig. 5. Time Order of Adoption of Agricultural Inputs in Each Urban Center in the Study Area and the Farmers' Awareness and Adoption Time.

this information upward to these merchants. Since no less than 77 percent of the farmers in three of the four villages obtained information from urban sources in the province, but as many as 90 percent in some villages did not travel to the more distant urban centers where the information was available years earlier, lack of knowledge about the inputs, especially at the awareness stage, clearly delayed the decision-making process.

Access to information was further delayed because farmers rarely informed fellow farmers of what they knew about new agricultural technology as traditionally assumed. Knowledge of the inputs was obtained through seeking. Seeking from one particular source was not the norm either. Farmers limited their contact with individuals who served as opinion leaders to the interest and persuasion stages. Awareness of an input occurred through contact with another individual, termed by some a gatekeeper.

Once a farmer was aware of an input the availability of sources possessing the knowledge to function as opinion leaders directly influenced the length of the adoption period. Research focusing on the innovator and early majority, the first groups of individuals to begin using new inputs, suggests that these people frequently serve as "influentials." It is suggested that they are creating the precedent for those who have not yet adopted. Implicit in this proposition is that adoption in some way enhances their ability to transmit knowledge about an innovation. This appears logical if source credibility is related to one's ability to deal with the characteristics of the innovation. An individual who has already adopted would be capable of providing the potential adopter with information about the complexity of the input, as well as first hand knowledge of its relative advantage, which could be assessed through observation without conducting a trial. Such information dealing specifically with the characteristics of an innovation could thus greatly reduce the adoption period. When the

communication behavior of the farmers with individuals who served as opinion leaders was examined, the time required for early and later adopters to complete the decision-making phase of adoption was closely linked to the availability of such sources. Fellow farmers functioned in this capacity for the later adopters, but for the early adopters such sources were limited. Thus, early adopters did not have precedent to follow. They instead were creating the precedent for the later adopters as has been previously hypothesized.

SUMMARY

This preliminary analysis of the temporal context of adoption of agricultural inputs by Thai farmers suggests the need to re-evaluate our thinking about the proposition that lack of knowledge does not delay adoption. Access to sources who possess the knowledge necessary to evaluate new technology may more accurately explain the rate at which innovations are adopted than intrapersonal differences of early and late adopters.

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